

# Worthington Industries Identifies Growth Potential in Cryogenic Technology

In 2012, Worthington Industries identified potential growth opportunities in its alternative fuels and industrial gas markets with cryogenic technology. After comprehensive research was performed, it was decided that Worthington's entry point into the market would be liquid cryogenic cylinders because of the synergies with the company's existing industrial gas product line. "We knew we wanted to not only enter this space, but to have a product that would differentiate ourselves from the competition," said Pressure Cylinders President Andy Billman.

As the development process kicked off, the team first had to identify current performance issues with cylinders that were already in the market. From there, the team identified how they could make improvements to those cylinders that were impactful to customers. Those answers were sought out by the development team through market research.

"We didn't go to the customers and ask them what they needed," said General Manager of Cryogenics Sean Murray. "Like Ford Motor Company founder,

Henry Ford, said, 'If I asked my customers what they needed, they would have told me a faster horse.' Your customers don't know what they want and what is possible."

To avoid that common mistake, the team uncovered what customers needed by observing how they used the cylinders on the job by going on-site to refurbishment operations to document the repair process and associated costs.

## **Innovative Solutions To Improve Customer Value & Product Performance**

The number one issue uncovered by the team's research was the high cost of refurbishing the liquid cylinders, and the frequency with which those cylinders were being sent to refurbishment because the customers didn't have the tools to properly identify the performance problem.

Between transport, movement within a site and exposure to the elements, liquid cylinders take a beating. When a cylinder is damaged or stops working unexpectedly, it is sent to be refurbished, which includes checking and replacing the cylinder's vacuum,

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repairing dents and polishing the cylinder. On average, cylinder refurbishment costs between \$300-\$800 – including shipping and assessment fees. Typically, cylinders are sent to refurbishment every five years; three times or more during its 15+-year lifespan. However, some customers were sending cylinders for repairs more frequently.

Prior to the development of Worthington’s state-of-the-art liquid cylinder, the most common reason cylinders were sent to refurbishment was to replace the vacuum. Our onsite team found that customers often misinterpreted the outgassing sound from a cylinder’s pressure relief device as being a faulty vacuum seal. Customers thought they were losing gas when this occurred, which prompted them to send the cylinder to be refurbished. Our research team found that at least 70 percent of the time, cylinders that were sent in to have the vacuum repaired, were still in good working condition when checked by the refurbishment company.

Customers were shelling out hundreds of dollars each for repairs because they weren’t able to properly diagnose the issue. Checking the vacuum of a cylinder is costly because each technician must have a specific skill-set. Having a cylinder “out-of-service” also resulted in down time for customers.

Our expert engineering team stepped in and took on the challenge of finding a cost-effective solution that would take the guess work out of troubleshooting vacuum issues with the cylinders. The Innovation team helped the engineers brainstorm and sift through possible solutions.

The innovation process resulted in a solution

that not only set our cylinders apart from the competition in performance and design, but one that could also save customers thousands of dollars in refurbishment costs over the lifespan of the cylinder. The answer? Developing a vacuum gauge and reader that could provide an on-site vacuum diagnosis. The team worked with a gauge manufacturer to develop a proprietary low vacuum gauge and reader to give customers the ability to diagnose their cylinders prior to sending them to be repaired. The gauge and reader reduced labor costs and down time, by putting a tool in the hands of customers. This is estimated to save between \$1,200 and \$1,800 in refurbishment costs over the lifespan of the cyl-



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inder.

Another innovative change made to the cylinders was developing a new, more accurate and reliable liquid level gauge. All cylinders in the market previously used the same liquid level gauge, but many times a cylinder’s gauge broke soon after the cylinder had been manufactured because it was easily jarred and broken. Our approach set a new standard by using a Rochester float gauge, which is a durable mechanical float gauge that is designed to withstand



jobsite and transport movement. “We took a time tested solution from our experience with propane tanks and added it to these vessels,” said Murray.

The research also identified the standard valve layout on cylinders was confusing to customers. The valves customers needed to use were interspersed with valves that only distributors should have been using, resulting in customers adjusting valves, which negatively affected cylinder performance. To fix that problem, our engineers designed a new layout, placing “customer” valves and “distributor” valves on opposite sides of the cylinder.

While they were focused on the valve layout, the engineering team also designed a new head ring shaped like a wave, that runs higher around the valves, making the valves more visible and accessible. They also addressed other small issues that made moving the cylinders a hassle such as adding a lift lug to all models and offering wheeled base.

While the engineers were working on design changes, other members of the cryogenics development team were searching for the best facility to manufacture the new liquid cylinders. After reviewing several facilities and considering all of the manufacturing needs, the group chose the Company’s Cylinders manufacturing operation in Westerville, Ohio. The Westerville facility was chosen for its team of experienced welders and available space to assemble a high volume of cylinders in a tightly controlled environment. Having a facili-



ty that was in close proximity to the corporate office was also a deciding factor. “Being close and able to access the facility easily was helpful for being able to move forward quickly with the development,” said Murray.

### Success Factors

There were many factors that made this product development process successful. First, the project was rooted in a deep understanding of customers’ needs, behaviors and environment. Identifying key opportunities that would improve the product performance and customer’s experience with the cylinders allowed Worthington to develop a unique solution. Murray said the innovation process of developing a broad spectrum of ideas that would improve any of our customers’ products and then filtering those ideas down helped the team identify what the customers really needed. That process allowed the business to focus on what they could attain immediately, while setting the business up for future growth through acquisitions and product development.

Murray also said having a strong, cross-functional team and leader was key to the success of the liquid cylinder project and its rapid launch to market. “Many times, people make

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the mistake of thinking product development is only the job of engineers. That is not the case. You need to have people on the development team who understand the engineering aspect and who understand the customer needs, and bring all of that insight to one table,” said Murray.

The process to a successful new product launch included significant trial and error. “We didn’t have much experience in developing new products through this type of research-based process. As a result, there was a lot of learning by doing,” said Murray. “In the long run, it helped us develop new capabilities.”

Following the successful liquid cylinder launch, Worthington has further grown its cryogenic technology portfolio, including developing a joint venture with a leading manufacturer in Turkey and purchasing a global life science

business and its manufacturing facility in Alabama. Worthington’s portfolio now includes bulk storage, standard and engineered tanks, ISO containers, transport trailers, liquid cylinders for industrial gas and beverage carbonation, cryogenic biologic specimen storage, dewars/shippers, controls and data management solutions for global biomedical research and development, healthcare, bio-banking, pharmaceutical, biotechnology and animal husbandry markets .

“Acquisitions have been a large part of how we have added new capabilities to our offering,” said Murray. “The goal is to continue to offer new products and businesses to increase our growth. Over the next five years, we hope to be among the top companies in the world offering cryogenic technology and services to industrial gas markets and across the LNG mobile pipeline.” 

